



ORIGINAL

Prevention of Complications Arising after Tooth Extraction

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SUMMARY

The study involved 67 patients with acute odontogenic inflammatory diseases of the jaws were examined. All examined patients underwent tooth extraction, which caused the development of an acute inflammatory process. We have determined the effectiveness of treatment of patients with the drug “Givalex,” which was used to prevent inflammatory post-extraction complications in patients with acute odontogenic inflammatory diseases. Based on the examinations of patients, it was proved that the multicomponent preparation “Givalex” used for oral baths after tooth extractions has an expressed antiseptic, anti-inflammatory and analgesic effect, as well as a deodorizing effect.

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INTRODUCTION

Extraction of teeth is one of the most common surgical interventions in dental surgery and outpatient maxillofacial surgery. Every day in Ukraine, in a planned manner (in the clinic) and by ambulance (at the maxillofacial trauma center), thousands of these surgical interventions are performed. If we consider the tooth extraction in chronic periodontitis, then in these cases the occurrence of postoperative inflammatory complications will be minimal.¹⁻³ But if we take into account the development of post-extraction complications during tooth extractions for acute (aggravated chronic) odontogenic inflammatory diseases of the jaws, then the number of complications will be significantly greater. One of the most common complications associated with tooth extraction is alveolitis.⁴ According to the literature, after tooth extraction, this complication occurs in 24-35% of cases, and according to our data – in 33.2% of cases.¹ Inflammatory infiltrates of the perimaxillary soft tissues often appear around the post-extraction wound, which significantly aggravate the course of the postoperative period.

The incidence of post-extraction inflammatory complications (inflammatory infiltrate, alveolitis) causes both temporary and long-term disability of patients (with the development of inflammatory infiltrates, abscesses and phlegmon), and since the patients are most often persons aged 18 to 50, i.e. of the most working age, then this problem is gaining importance not only as a general medical, but also a socio-economic one.⁵⁻¹¹ This circumstance does not allow us to assert that the existing methods of prevention are sufficiently effective.

Complications that arise in acute odontogenic inflammatory diseases of the jaws can cause temporary and also long-term disability. Since these diseases are most often affected by persons of young and middle age, i.e. the most able-bodied part of the population, and then this problem is gaining importance not only as a general medical, but also a socio-economic one.

For prophylactic anti-inflammatory therapy of patients with acute odontogenic inflammatory diseases of the jaws, various antibacterial drugs (antibiotics, sulfonamides, etc.) are used. The use of these medicines does not always make it possible to significantly reduce the number of post-extraction inflammatory complications. This is due to the fact

that there are a large number of microorganisms in the human oral cavity, which, under unfavorable conditions (the presence of carious and decayed teeth, inflammatory changes from the mucous membranes and other factors), can cause the development of inflammatory processes in the socket of the extracted tooth. The applied drug treatment should be aimed at preventing the penetration of pathogenic microorganisms into the socket of the extracted tooth.

When choosing an antimicrobial drug, we must focus on the purpose of its use, and it must be both prophylactic (preventing the development of inflammatory complications) and therapeutic (treatment in the early stages of the developed inflammatory process). In drugs that are used for prophylactic purposes, only substances with antimicrobial properties are sufficient, and for therapeutic purposes, it is necessary to have drugs that have analgesic and anti-inflammatory properties, i.e. combined action. The most popular are those chemotherapy drugs that can be used for one or another purpose, i.e. therapeutic and prophylactic.

One of these drugs is Givalex (NorginePharma, Dreux, France). The pharmacological action of Givalex is due to the presence of three active ingredients that are part of this drug.¹⁻³ Givalex is available in the form of a solution for rinsing the mouth. One milliliter of solution contains 1 mg of hexetidine, 5 mg of choline salicylate, 2.5 mg of chlorobutanol hemihydrate. Excipients – sodium saccharinate, polysorbate 20, propionic acid, ethyl alcohol 58%, purified water, lemon flavor. The antimicrobial activity of Givalex is due to the presence of hexetidine, which exhibits its antibacterial effect not only against gram-positive, but also against gram-negative microbes, and also has an antifungal effect (yeast-like fungi of the genus *Candida*, *microsporus*, *Histoplasma*, etc.). The action mechanism of hexetidine is that it has a competitive effect with the bacterial growth factor thiamine. The chemical structure of hexetidine is similar to that of thiamine, which allows it to inhibit the reproduction of bacteria (it blocks the metabolism of purine in bacteria). Hexetidine binds to proteins of the oral mucosa and is thus retained there for a long time, which ensures its prolonged effect. Choline salicylate, like all salicylates, has analgesic, antipyretic and anti-inflammatory activity, blocking cyclooxygenase and inhibiting the biosynthesis of prostaglandins, which are mediators of pain sensitivity and inflammation.

The aim of the study is to determine the effectiveness of "Givalex" for the prevention of inflammatory post-extraction complications in patients with acute odontogenic inflammatory diseases.

MATERIALS AND METHODS

The study involved 67 patients with acute odontogenic inflammatory diseases of the jaws (aggravated chronic periodontitis, acute and recurrent chronic pericoronitis) aged 17 to 49 years. The main group consisted of 37 patients. The drug "Givalex" was prescribed to these patients as an antiseptic bath. For one bath, 2 teaspoons of the drug are used, which are dissolved in ¼ glass of warm water. For one day, from 2 to 4 procedures were prescribed. The course of treatment with Givalex was 3-4 days. The control group consisted of 30 patients with the same diseases and the same age, who, in the dynamics of the treatment, for antiseptic baths, we used a furacilin solution (0.02% aqueous sterile solution or at a dilution of 1:5000).

In the dynamics of the examination of patients, they underwent a general clinical examination, which included: clarification of complaints, examination, palpation, anamnesis, jaw X-ray, complete blood count. In addition to studying the dynamics of changes in clinical symptoms, the examined patients underwent microbiological methods (the microflora in the area of the extracted tooth and throat was determined, as well as its antibiotic sensitivity), contact thermometry, the Schiller-Pisarev test (to identify the inflammatory process of the mucous membrane of the alveolar process) with the calculation of the Svrakov iodine number.

Clinical symptoms and the obtained digital data of laboratory examinations were processed by the variational-statistical method using a personal computer. The reliability of the results was calculated according to Student's t-test. Differences were considered significant at $P < 0.05$.

RESULTS AND DISCUSSION

Microbiological examinations were carried out in 22 patients of the main group. Control group – 20 patients. In 42 patients with acute odontogenic inflammatory diseases of the jaws, the following microorganisms were seeded in the socket of the extracted tooth: *Staphylococcus aureus* (66.7%)

and *Staphylococcus epidermidis* (38.1%), *hemolytic Streptococcus* (21.4%). If we compare the species composition of the detected microflora, depending on the observation group, it can be noted that it was practically the same. Microorganisms in associative connections were detected in 11 patients (26.2%).

In 42 patients with acute odontogenic inflammatory diseases of the jaws, the following microorganisms were inoculated in the pharynx area: *Staphylococcus aureus* (in 66.7%) and *Staphylococcus epidermidis* (23.8%), *hemolytic Streptococcus* (26.2%). Microorganisms in associative connections were detected in 8 patients (19.1%).

Before the tooth extraction from the pharynx, pathogenic microorganisms were inoculated in 100% of cases in the main and control groups. 4-5 days after the surgery, the microflora from the pharynx in the main group was sown in 4 out of 22 patients (18.2%), and in the control group – in 14 out of 20 patients (70.0%).

When 37 patients with acute odontogenic inflammatory diseases of the jaws were treated in the main group (with the use of Givalex), a general temperature reaction (an increase in temperature above 37.5°C) was observed in 22 patients (59.5%). In the control group, i.e. in 30 patients with acute odontogenic inflammatory diseases of the jaws treated with furacilin solution, a general temperature reaction was observed in 18 patients (60.0%). On 2-3 days of the drug treatment, the total body temperature increased by more than 37.5°C in 5 patients (13.5%) in the main group, and in 12 people in the control group (40.0%). After 4-5 days of drug treatment of patients with acute odontogenic inflammatory diseases of the jaws, the total body temperature in the main group returned to normal in the entire group, and in the control group in 6 patients (20.0%) the body temperature was from 37.0°C to 37.3°C, and in the rest of the control group, the body temperature returned to normal.

When treating main group patients with acute odontogenic inflammatory diseases of the jaws, pain in the area of the pathological focus of an expressed nature was detected in 7 out of 37 patients (18.9%), and moderate in 30 patients (81.1%). In the treatment of control group patients with acute odontogenic inflammatory diseases of the jaws, severe pain was observed in 6 out of 30 patients (20.0%), moderate pain in 24 patients (80.0%), there were no insignificant pain. 2-3 days after the extraction of the causative

teeth, there were no expressed pain sensations in the area of the postoperative wound in both groups. During these periods, the patients of the main group (treated with Givalex) had moderate pain in 10 out of 37 patients (27.0%), and insignificant pain in 27 patients (73.0%). In the control group (with the use of furacilin), at the same time, moderate pains were recorded in 21 out of 30 patients (70.0%), and insignificant pain – in 9 patients (30.0%). After 4-5 days from the beginning of the treatment in the main group, there were no pain of severe and moderate nature, insignificant pain were observed in 3 out of 37 patients (8.1%), in the rest of the examined patients no pain was detected. After 4-5 days, patients in the control group did not have severe and moderate pain; 17 out of 30 patients (56.7%) had insignificant pain in the post-extraction wound, and we did not find any pain symptoms in 13 patients of this group.

Bad breath in patients of both observation groups during treatment was recorded in 100% of cases. After 2-3 days of treatment in patients of the main observation group (with the use of Givalex), the bad breath was detected in 10 out of 37 examined (27.0%), and in the control group – in 22 out of 30 examined (73.3%). After 4-5 days of treatment, the bad breath in the main group was recorded in 2 of 37 patients (5.4%), and in the control group – in 13 patients (43.3%).

Inflammatory infiltration (moderate, deep) of soft tissues (around the pathological focus) that surround the mandible in the main group was found in 29 out of 37 patients, i.e. in 78.4% (in the control group - in 21 patients out of 30, i.e. in 70.0%). After 2-3 days of treatment, in the main group, inflammatory infiltration of soft tissues was found in 16 out of 37 patients, i.e. in 43.2% (in the control group - in 19 out of 30 patients, i.e. in 63.3%). After 4-5 days, inflammatory infiltration of the soft tissues that surround the mandible was detected in the main group in 3 out of 37 patients, i.e. in 8.1% (in the control group – in 7 out of 30 patients, i.e. in 23.3%).

Svrakov iodine number on 2-3 days of the treatment in the main group was 4.8 ± 0.7 (moderately expressed inflammatory process), and in the control group – 6.7 ± 0.8 points (intense inflammatory process). On 4-5 days of treatment, the Svrakov iodine number in the main group was 2.1 ± 0.3 points (mild inflammatory process), and in the control group – 4.7 ± 0.7 points (moderate inflammatory process). On 7-8 days, Svrakov iodine number in the main group was 1.3 ± 0.4 points (mild

inflammatory process), and in the control group – 3.7 ± 0.6 points (moderate inflammatory process).

Inflammatory complications (alveolitis, inflammatory infiltrate, regional lymphadenitis) in the post-extraction period in the patients of the main observation group were found in 3 patients (8.1%), and in those in the control group – in 7 patients (23.3%). We did not find any complications associated with the use of the “Givalex.”

CONCLUSIONS

Based on our examinations of patients with acute odontogenic inflammatory diseases of the jaws, it was proved that the multicomponent drug “Givalex” used for oral baths after tooth extractions has an expressed antiseptic, anti-inflammatory and analgesic effect, as well as a deodorizing effect. We did not find any side effects of the drug “Givalex”.

Thus, the drug “Givalex” can be recommended for maxillofacial surgeons and dental surgeons for the prevention and treatment of post-extraction complications in patients with acute odontogenic inflammatory diseases of the jaws.

AUTHOR CONTRIBUTION

Conceptualization: Tymofieiev OO. Data and interpretation acquisition: Tymofieiev OO, Ripa VM, Havlytiuk D, Sokoliuk M, Kolisnichenko LA. Drafting of the manuscript: Ripa VM. Critical revision of the manuscript: Tymofieiev OO. Approval of the final version of the manuscript: all authors.

REFERENCES (11)

1. Tymofieiev OO. Manual of Maxillofacial and Dental Surgery [Russian]. 5th edition. Kyiv: Chervona Ruta-Turs; 2012.
2. Tymofieiev OO. Maxillofacial surgery and surgical dentistry [Russian]. 1st Volume. 1st edition. Kyiv, Ukraine: All-Ukrainian Specialized Publishing House “Medicine”; 2020.
3. Tymofieiev OO. Maxillofacial Surgery [Ukrainian]. 3rd edition. Kyiv, Ukraine: All-Ukrainian Specialized Publishing House “Medicine”; 2021.
4. Speechley JA. Dry socket secrets. *Br Dent J* 2008;205(4):168.
<https://doi.org/10.1038/sj.bdj.2008.703>
5. Simon E, Matee M. Post-extraction complications

- seen at a referral dental clinic in Dar Es Salaam, Tanzania. *Int Dent J* **2001**;51(4):273–6.
<https://doi.org/10.1002/j.1875-595x.2001.tb00837.x>
6. Hatab N, Yahya J, Alqulaihi S. Management of alveolar osteitis in dental practice: a literature review. *J Diagn Treat Oral Maxillofac Pathol* **2017**;1(3–4):147–55.
<https://doi.org/10.23999/j.dtemp.2017.34.7>
 7. Vettori E, Costantinides F, Nicolin V, Rizzo R, Perinetti G, Maglione M, Di Lenarda R. Factors influencing the onset of intra- and post- operative complications following tooth exodontia: retrospective survey on 1701 patients. *Antibiotics (Basel)* **2019**;8(4):264.
<https://doi.org/10.3390/antibiotics8040264>
 8. Khan FR, Iftikhar K, Hashmi A, Ismail M, Siddiqui SH, Siddiqui HK. Complications of extraction socket among diabetic, hypertensive and smokers in comparison to normal patients. *Adv Oral Maxillofac Surg* **2021**;2:100032.
<https://doi.org/10.1016/j.adoms.2021.100032>
 9. Pierse JE, Dym H, Clarkson E. Diagnosis and management of common postextraction complications. *Dent Clin North Am* **2012**;56(1):75–93.
<https://doi.org/10.1016/j.cden.2011.09.008>
 10. Bouloux GF, Steed MB, Perciaccante VJ. Complications of third molar surgery. *Oral Maxillofac Surg Clin North Am* **2007**;19(1):117–28.
<https://doi.org/10.1016/j.coms.2006.11.013>
 11. Yue Yi EK, Siew Ying AL, Mohan M, Menon RK. Prevalence of postoperative infection after tooth extraction: a retrospective study. *Int J Dent* **2021**;2021:6664311.
<https://doi.org/10.1155/2021/6664311>